

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A semiconductor memory device including: a memory cell having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges and being an insulator containing a silicon nitride film, each memory functional unit being formed so that at least a part of the memory functional unit overlaps with a part of the diffusion region; and an amplifier, the memory cell and the amplifier being connected to each other so that an output of the memory cell is inputted to the amplifier.

2. (Original) The semiconductor memory device according to claim 1, wherein one or more transistors are connected in series to the memory cell.

Claim 3 (Cancelled).

4. (Previously presented) The semiconductor memory device according to claim 1, wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film.

5. (Previously presented) The semiconductor memory device according to claim 4, wherein the film having the function of retaining charges is disposed substantially parallel with the side face of the gate electrode.

6. (Currently amended) ~~The semiconductor memory device according to claim 4,~~
A semiconductor memory device including: a memory cell having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on

both sides of the gate electrode and having a function of retaining charges, each memory functional unit being formed so that at least a part of the memory functional unit overlaps with a part of the diffusion region; and an amplifier, the memory cell and the amplifier being connected to each other so that an output of the memory cell is inputted to the amplifier, wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film and wherein the memory functional unit has an insulating film for separating the film having the function of retaining charges from the channel region or semiconductor layer, and the insulating film is thinner than the gate insulating film and has a thickness of 0.8 nm or more.

7. (Currently amended) ~~The semiconductor memory device according to claim 4,~~
A semiconductor memory device including: a memory cell having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges, each memory functional unit being formed so that at least a part of the memory functional unit overlaps with a part of the diffusion region; and an amplifier, the memory cell and the amplifier being connected to each other so that an output of the memory cell is inputted to the amplifier, wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film and wherein the memory functional unit has an insulating film separating the film having the function of retaining charges from the channel region or semiconductor layer and the insulating film is thicker than the gate insulating film and has a thickness of 20 nm or less.

8. (Original) A display device in which the semiconductor memory device according to claim 1 is incorporated.

9. (Original) A portable electronic apparatus in which the semiconductor memory device according to claim 1 is incorporated.

10. (Currently amended) A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges and being an insulator containing a silicon nitride film; wherein outputs of the paired memory cells are inputted to the amplifier.

11. (Currently amended) ~~The semiconductor memory device according to claim 10,~~
A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges; wherein outputs of the paired memory cells are inputted to the amplifier, and
wherein the gate electrodes of the paired memory cells integrally function as a word line, and the paired memory cells integrally share the memory functional units at both sides of the gate electrodes.

12. (Original) The semiconductor memory device according to claim 10, wherein the memory cell is rewritable in first and second storing states of different amounts of charges accumulated in the memory functional units and, at the time of reading, one of the paired memory cells is in the first storing state, and the other memory cell is allowed to operate in the second storing state.

13. (Currently amended) ~~The semiconductor memory device according to claim 10,~~

A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges; wherein outputs of the paired memory cells are inputted to the amplifier, wherein the memory cell is rewritable in first and second storing states of different amounts of charges accumulated in each of two memory functional units formed on both sides of a gate electrode, and wherein at the time of reading, the storing states of the two memory functional units belonging to the same memory cell are the same and information stored in memory functional units belonging to one of the paired memory cells is different from information stored in memory functional units belonging to the other of the paired memory cells.

14. (Currently amended) ~~The semiconductor memory device according to claim 10,~~
A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges; wherein outputs of the paired memory cells are inputted to the amplifier, and wherein a plurality of paired memory cell are connected to the amplifier, the paired memory cell are connected to different word lines, and an output of a predetermined paired memory cell is inputted to the amplifier by selection of one word line.

15. (Original) The semiconductor memory device according to claim 10, wherein one or more transistors are connected in series to the memory cell.

16. (Original) The semiconductor memory device according to claim 10, wherein the memory functional unit is formed so that at least a part of the memory functional unit overlaps with a part of the diffusion region.

17. (Previously presented) The semiconductor memory device according to claim 10, wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film.

18. (Currently amended) ~~The semiconductor memory device according to claim 17,~~
A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges; wherein outputs of the paired memory cells are inputted to the amplifier, wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film, and wherein the film having the function of retaining charges is disposed substantially parallel with the side face of the gate electrode.

19. (Currently amended) ~~The semiconductor memory device according to claim 17,~~
A semiconductor memory device including: an amplifier; and first and second paired memory cells each having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed below the gate electrode, a diffusion region disposed on both sides of the channel region and having a conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function of retaining charges; wherein outputs of the paired memory cells are inputted to the amplifier wherein the memory functional unit includes a film having the function of retaining charges and whose surface is substantially parallel with the surface of a gate insulating film, and wherein the

memory functional unit has an insulating film for separating the film having the function of retaining charges from the channel region or semiconductor layer, and the insulating film is thinner than the gate insulating film and has a thickness of 0.8 nm or more.

20. (Original) The semiconductor memory device according to claim 17, wherein the memory functional unit has an insulating film separating the film having the function of retaining charges from the channel region or semiconductor layer and the insulating film is thicker than the gate insulating film and has a thickness of 20 nm or less.

21. (Original) A display device in which the semiconductor memory device according to claim 10 is incorporated.

22. (Original) A portable electronic apparatus in which the semiconductor memory device according to claim 10 is incorporated.